Scope of work:

Name of work: Upgradation of existing 60 MLD Sewage Treatment Plant to ultimate build capacity 80 MLD at Kengeri by Providing Electro-Mechanical and Instrumentation equipments.

Under Cauvery Water Supply Scheme Stage 4 Phase II project a 60 MLD capacity Sewage Treatment Plant has be constructed at Kengeri. It was envisaged that the flow will increase 80 MLD by 2020 and civil structures have been built to treat ultimate capacity of 80 MLD. The Electro-Mechancial equipments required for treating additional 20 MLD has not been provided.

At present the flow has increased more that 60 MLD. It is proposed to enhance the capacity of the Sewage Treatment Plant to its ultimate capacity of 80 MLD by providing Electro-Mechancial and instrumentation equipments in the existing civil structures. The work involves supply, erection, testing and commissioning of the equipments in the following civil structures.

1. **Terminal Sewage Pumping Station (TSPS)** - There are three (3) raw sewage intake channels. The existing 20 mm coarse screens are not adequate to meet the heavy grit and debris in the influent. The existing coarse screens have to be replaced with a new Heavy Duty Coarse Screens with a new conveyor system. The power supply to new screens shall be draw from existing drive control units by providing new local control panel.

At present Six (6) Submersible pump sets have been installed in the wet well with capacity of 1400 m^3/hr, 27 m Head each. Two (2) new submersible pump sets have to be installed in the space provided for expansion in exciting wet well with new DN 500 PN 10 DI piping, Knife Gate Valve with actuator, Non Return Valve and pressure gauge (0-4 kg/cm^2) for each pump. Each pump delivery pipeline shall be linked to existing 1200 mm dia Mild Steel Common Header delivery manifold.

Variable Frequency Drives (VFD) shall be provided in existing TSPS MCC for each motor with Low Voltage (LV) switch gears, Power Cables and Earthing complete. 3-Pole MCB each shall be provided for new valve actuator. Pump Local Control station, Motor Protection Unit and Power Distribution Box shall be provided for each motor.

2. **Head Works** - There are Six (6) inlet flow channels out of which Five (5) channels have been provided with Sluice Gates on the upstream and down Stream of Fine Screens. Two new Sluice Gates shall be installed in the space provided for expansion in the existing civil structure, one (1) on the upstream and one (1) on the down stream side of Fine Screen unit. One (1) new Fine Screen unit shall be provided in the 6^{th} Channels with necessary electrical control panel, cabling complete similar to existing layout drawing.

3. **Primary Treatment Unit (PTU)** - There are Four (4) de-gritting channel out of which Three (3) de-gritting units have been installed, one (1) new de-gritting unit, flow deflectors plates, grit clarifier mechanism shall be installed in the

space provided for expansion existing in the civil structure. One (1) Organic Return Pump with level switch shall also be provided. Twelve (12) deflector plates shall be provided in the inlet channel. The Low Voltage switchgear and Local Control Switch shall be provided for Grit Clarifier, de-gritting unit, organic return pump and scrappers with necessary cabling complete similar to existing layout drawing.

4. **Primary Clarifier** - There are Four (4) Clarifier units out of which Three (3) Clarifier bridge mechanism have been installed and working. One (1) new Clarifier bridge mechanism shall be installed in existing civil structure. One (1) inlet sluice gate shall be installed in common distribution chamber, and 150 mm dia sludge drain line (DI length approx 60m) shall be installed with Two (2) Knife Gate valves (150 mm dia). A 150 mm dia DI pipeline (approx 40m) shall be laid from scum pit to scum chamber similar to existing layout drawing. The Low Voltage switchgear shall be provided for Clarifier bridge mechanism with necessary cabling complete.

5. **Primary Sludge Pumps -** There are six (6) Primary sludge pumpsets, Two (2) for each Clarifier. Two (2) new Primary sludge pump sets shall be installed on the existing foundations in the existing building. Each pump shall be provided with suction and delivery piping with, Knife Gate Valves with actuators, Non Return Valves, Electro-Magnetic Flow Meters, local push button station, for each pump set similar to existing layout drawing.

6. **Plant Motor Control Center** (PMCC) - The LT power supply switch gears for Chemical Building, Bio Reactor MLR pump sets and RAS pump sets with VFD, Disc Filter unit, Primary Sludge Pumps and Sludge Thicker units and pumps shall be provided in the PMCC as per the required rating. The PMCC switchgear SLD drawings are attached for reference. One (1) set of Battery charger and Battery Bank (100Ah) shall be provided in the existing PMCC building.

7. **Bio Reactor** - There are four (4) Bio-Reactor and Three (3) Bio-Reactors are functioning. One(1) inlet sluice gates and Two (2) outlet sluice gates shall be provided, (1 No MLR Discharge gate to Anaerobic basin and and 1 No Anoxic basin).

Return Activated Sludge (RAS) pipeline (800 mm dia DI pipeline) shall be extender to the 4th Bio Reactor and 400 mm dia DI branch pipeline upto Anaerobic Zone, 300 mm dia DI pipeline upto Anoxic Zone, with necessary Knife Gate Valves, Reducer Tee, Bends and EMF Flow meters, similar to existing layout drawing. The approximate quantity of piping and specials is as follows:

1. 90 degree, 800 mm dia Flanged DI Bends - 4 Nos
2. 800 mm dia Flanged DI pipe - 5 mts
3. 800 mm x 300 mm dia DI Flanged Tee - 1 No.
4. 800 mm x 400 mm dia DI Flanged Tee - 1 No.
5. 400 mm dia Double Flanged DI pipe - 2 mt
6. 400 mm x 400 mm Double Flanged DI Tee - 1No.
7. 400 mm dia Knife Gate Valve with Actuator and Mechanical Joint and - 1 No.
8. 400 mm dia Knife Gate Valve Manually operated with Mechanical Joint - 1 No.

9. 400 mm dia Single side Flanged DI pipe - 2.5 mt
10. 400 mm dia Electro-Mangnetic Flow Meter - 1 No.
11. 400 mm dia double Flanged DI pipe - 1.5mt
12. 90 degree, 400 mm dia Double Flanged DI Bend - 4 Nos.
13. 300 mm dia Double Flanged DI pipe - 3mt
14. 300 mm dia Knife Gate Valve with Actuator and Mechanical Joint and - 1 No.
15. 300 mm dia Knife Gate Valve Manually operated with Mechanical Joint - 1 No.
16. 300 mm dia Single side Flanged DI pipe - 5 mt
17. 300 mm dia Electro-Mangnetic Flow Meter - 1 No.
18. 90 degree, 300 mm dia Double Flanged DI Bend - 3 Nos.
19. Flange Rubber gaskets, Fasteners and MS supports and clamps for all the above piping.

4 kW Mixers (4 Nos) shall be installed in Anaerobic zone and 10 kW Mixers (6 Nos) shall be installed in Anoxic Zone (3 Nos) & Post Anoxic zone (3 Nos), with manual lifting winch mechanism and necessary Local push button stations & cable work.

Two (2) Nos Mixed Liquor Re-circulation (MLR) pumps shall be installed in the existing civil structure, and the monorail (ISMB 300 mm x 140mm, Approx length 32 m) shall be extended up to the outer wall of the Bio Reactor (towards Vrushabavathi river) for moving and erection of the pump to the locations. One (1) open channel Ultrasonic Flow Meter shall be installed in existing channel.

Air Diffuser (150 sets containing 8 diffuser in each set) shall be installed in Anoxic Zone and Post Anoxic Zone as per the existing diffuser array arrangements (as per drawing) by extending the existing Stainless Steel (SS 316) Air lines from Blower Room up to the 4^{th} Bio Reactor with all necessary Butterfly valves, Knife Gate Valves and EMF Flow meters similar to existing piping layout drawings. The approximate quantity of piping and specials is as follows:

1. 1100 mm dia SS 316 Common Header near Blower Room - 3 mt.
2. 600 mm dia SS 316 Air Manifold - 150 mt
3. 600 mm dia Butterfly Valve with Actuator - 1 No.
4. Thermal Mass Flow meter - 1 No.
5. 300 mm/250mm/200mm/150mm/50mm dia SS 316 pipeline (reducing) - 700 mt (approx)
6. 300 mm dia Butterfly valve with Actuator & SS Expansion Bellows - 4 Nos
7. 300 mm dia Orifice Flow meter - 4 Nos.
8. ID 50 mm dia 10 Bar, Flex Steel wire braded EPDM Hose pipe (EN ISO - 9001:2008 Vardaman Make) with Cam Lock coupling system - 150 Nos.
9. 50 mm Ball Valves - 150 Nos.
10. 3m height Light poles with 40 W LED fittings shall be installed in all new 20 MLD units.

Three (3) Nos Dissolved Oxygen sensors (DO) shall be installed in Anoxic Zone (2 Nos) and one (1) in Aeration zone. One (1) No Oxygen Reduction Potential (ORP) Analyser in Anaerobic zone, with necessary cabling till the local PLC unit.

Outdoor 3 mt height lighting poles with 40 W LED light fittings (20 Nos) shall be provided in the Bio Reactor area and other units as per the instructions of the engineer.

8. **Air Blower** - At present Four (4) Nos Air Blower have been installed. One (1) new Turbine Air Blower shall be installed on the existing foundation in the Blower Building. The discharge pipe (600 mm dia SS pipeline) shall be connected to the existing Air Header Manifold by extending with all necessary valves. The power shall be derived from the PMCC room by laying power cable of necessary rating.

9. **Secondary Clarifier -** There are Four (4) Clarifier units out of which Three (3) Clarifier bridge mechanism have been installed and working. One (1) new Clarifier bridge mechanism shall be installed in existing civil structure. One (1) inlet sluice gate shall be installed in common distribution chamber. The quantity of 450 mm dia sludge drain line valve and specials to be installed in Sludge drain chamber is as follows:

1. 450 mm dia Knife Gate Valves with extension spindle, Mating flanges and Mechanical Joint - 1No.
2. 150 mm dia Knife Gate Valves - 1no (for flushing)

A 150 mm dia DI pipeline (approx 60m) shall be laid from scum pit to scum chamber similar to existing layout drawing.

The Low Voltage switchgear shall be provided for Clarifier bridge mechanism with necessary cabling complete in MCC room.

10. Disc Filter - At present Four (4) Nos Disc Filter Units have been installed. One (1) new Disc Filter Unit shall be installed in the existing civil structure. A Inlet sluice gate shall be installed in the inlet channel and a sluice gate shall be installed in the inlet to CCT chamber opening on the outlet of disc filter channel as per the layout drawing. The power supply for the Disc Filter shall be drawing from the MCC room by providing necessary power cable and switch gear.

11. **Sludge Thickener system** - At present there are Two (2) Gravity Sludge Thickener units in operation. One (1) new Gravity Sludge thickener mechanism shall be installed in the existing civil structure. The power supply for the Drive Mechanism shall be drawing from the MCC room by providing necessary power cable and switch gear. A 150mm dia DI sludge extraction line with Electro-Magnetic flow meter (80mm), with bypass Isolation valves arrangement and flushing line shall be provided. Scum pipe lead off piping shall be provided, as per the drawing.

Thickened Sludge Pump House - At present there are Three (3) Sludge Thickener pump sets in operation. Two (2) new Sludge thickener pump set shall

be installed in the existing civil structure, with all necessary accessories such as piping, valves and flow meters, and a 150 mm dia DI pipeline shall be laid (buried) from Thickener to Plant drain sump to drain the supernatant, as per the layout drawing.

11. **Return Activated Sludge (RAS) Pump House** - At present there are Nine (9) RAS pumpsets in operation. Three (3) new RAS pumpsets shall be installed on the existing civil foundations, with all necessary accessories such as suction & discharge piping, valves and flow meters as per the piping layout drawing. The approximate quantity of DI piping and specials is as follows:

1. 500mm dia KGV, Manually operated - 1 No
2. 450 mm EMF meter - 1 No
3. 450 mm KGV, Manually operated - 3 Nos
4. 350 mm KGV, Manually operated - 3 Nos
5. 450mm x 450mm Flanged Tee -2 Nos
6. 800 mm x 350mm Flanged Tee -3 Nos
7. 90 degree 450mm Flanged bends - 2 Nos
8. 500 mm x 450 mm Flanged Tee - 1 No.
9. 500 mm x 350 mm Flanged Tee - 3 Nos
10. 300 mm NRV - 3 Nos
11. 300 mm KGV, with Actuator - 3Nos
12. 50 Air Out valve - 3 Nos
13. Pressure gauge - 0 to 2.5 kg/cm^2
14. MJ Collars where ever required

The power supply for the pumpsets shall be drawn from the MCC room by providing switchgear and power cable.

13. **Power Cables and Cable Trays -** The Power cable shall be supplied as per the existing rating and and shall be installed existing cable trays and shall supply new trays wherever cable trays are not available.

14. **Testing and commissioning -** The testing and commissioning shall be carried out as per the manufacturers recommendations, in coordination with engineers of operation and maintenance contractor.

The tenderer should compulsorily visit the plant and acquaint with scope of work before submission of the bids. The length of cable, cable tray and pipeline quantity is approximate. The tenderer should assess the actual length and extent of work required to complete the work in all respect for commissioning the equipments before submission of the bids.

The Mechanical GA drawings and Electrical SLD drawings have been attached for information and reference. The photographs of location in which the new equipments are to be erected is also enclosed.

The details of the existing make of the equipments are attached for reference. The existing make of the equipments are preferred for ease of erection and expansion. Tenderers are advised to supply the equipments of same make as for as possible.

For any further information, the tenderer may contract the office of the Executive Engineer, Waste Water Management, V.Valley Projects Division, Mysore Road, Nayanadahalli, Bengaluru - 560 039, during working hours.